CASE REPORTS

An unexplained foreign body in the myocardium

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An intracardiac foreign body was detected incidentally while the patient was having a pacemaker implanted. Even after necropsy its nature and mechanism of entry remained unclear.

CASE HISTORY

A 78-year-old retired accountant sought advice because of recurrent blackouts. They had occurred over 49 years and happened every few months. Before an attack he would feel hot and start to sweat. He would lose consciousness for about 5 seconds and then rapidly return to normal. A year before, when he had a circumcision, the anaesthetists had noted an erratic pulse. He was found to have atrial fibrillation but 24 hour ambulatory electrocardiography showed no prolonged pauses and on echocardiography the heart seemed structurally normal. The initial diagnosis was of recurrent vasovagal attacks with more recent onset of atrial fibrillation. Blackouts continued, and one caused special concern because for two hours afterwards he was left with dysphasia and right facial paralysis. In addition to atrial fibrillation his electrocardiogram now showed left anterior hemiblock and right bundle branch block. In view of these new conduction abnormalities he was advised to have a pacemaker.

On his preoperative chest X-ray (Figure 1) and on screening for pacing he was found to have a linear, apparently metallic, needle-like structure with a gap in its centre. This was shown to lie in the left hemithorax and three weeks after successful pacing a CT scan confirmed that the foreign body lay in his heart. The patient was closely questioned about previous trauma. Neither he nor his wife could recall any traumatic experience. He had worked in Kenya during the Second World War and had not served in the Armed Forces. He gave permission for his heart to be examined when he died.

3 years later he was admitted with a gastrointestinal bleed due to a duodenal ulcer. Despite a laparotomy and underrunning of the bleeding ulcer he had a postoperative haematemesis and died. At necropsy the heart showed obvious gross concentric left ventricular hypertrophy, mild senile calcific aortic stenosis and moderate to severe coronary artery disease. A single-channel pacemaker wire was firmly adherent in the apex of the right ventricle (Figure 2). On the anterior surface of the heart just adjacent to the left anterior descending artery there was a short fibrous tag within which was a firm grey/black nodule.

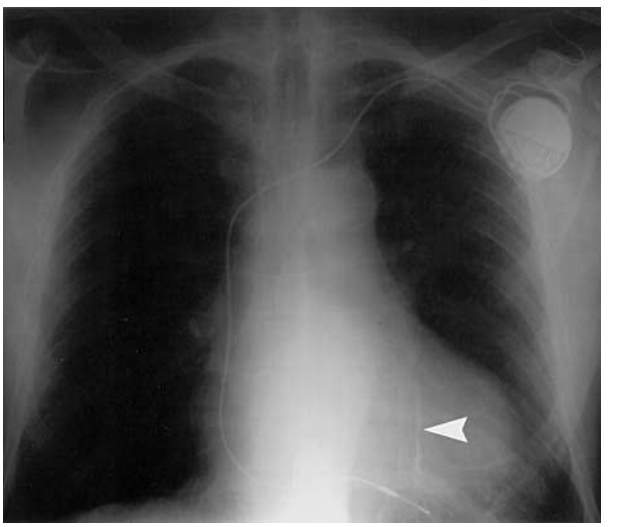

Figure 1 **Chest X-ray following pacing demonstrates the linear metallic fragment (white arrowhead)**

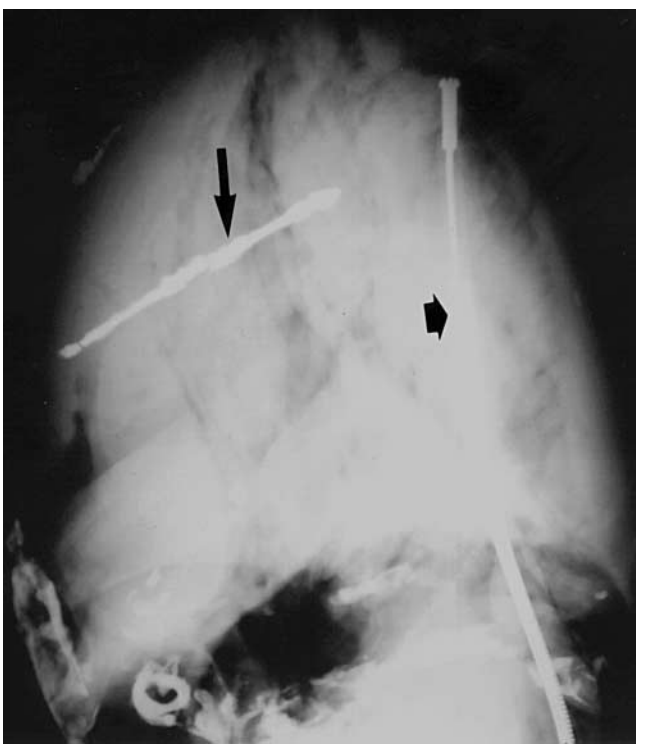

Figure 2 **Post-mortem X-ray of heart demonstrates the foreign body (long arrow) and the pacing wire (short arrow)**

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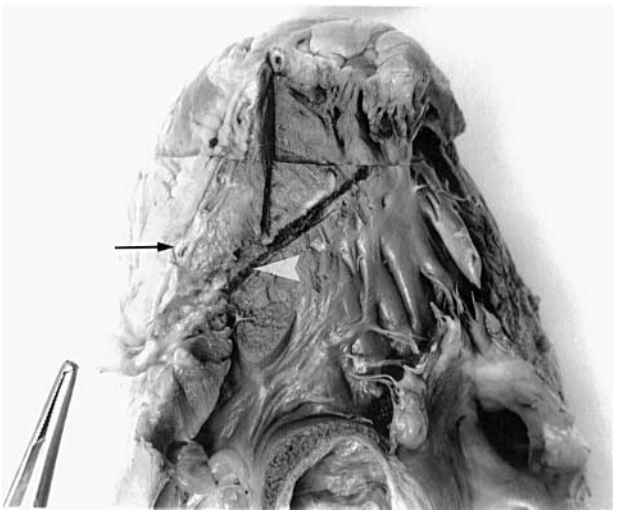

Figure 3 **Section through the heart at necropsy showing relation of the metallic fragment (white arrowhead) to the tag (presumed entry site) and the left anterior descending coronary artery (black arrow)**

Dissection below this revealed a tract containing a straight rusty iron fragment 6 cm in length and less than 1 mm in diameter. There was extensive brown staining in the immediately surrounding tissue secondary to iron deposition. The metal came within 4 mm of the left anterior descending artery and was seen to run in the interventricular septum close to the right ventricular endocardium (Figure 3).

A sample of metal was retrieved and subjected to electron microscopic examination, which showed a thin metal core with surrounding rust. X-ray microanalysis revealed the presence of iron only. There was no evidence of material that could have been used for galvanizing and no other metallic elements were present that might have suggested a complex type of steel.

COMMENT

It remains quite unclear how this piece of iron entered the heart, but the fibrous tag presumably indicates a site of entry, so the most likely cause must be an unrecognized injury in the distant past, perhaps in childhood, rather than migration via the venous system from a distant site. In view of its position, the patient was fortunate not to have sustained damage to his left anterior descending coronary artery, but it seems possible that its site in the interventricular septum was responsible for the conduction abnormality which brought its presence to light.

Acknowledgment We thank Dr R Moate, of the EM Unit, Faculty of Science, University of Plymouth, for performing the X-ray microanalysis.

A plastic explosive by mouth

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C-4 is a plastic explosive substance similar in structure to Semtex that is used by both military and terrorist organizations. It has a reputation for producing a buzz as well as a bang.

CASE HISTORY

A previously fit soldier of 21 was seen in the accident and emergency department after ingesting a cube of C-4 about 1 cm across. It was the onset of nausea and vomiting 2 hours later that caused him to attend. On admission he was alert and well oriented. He was given by mouth 95 g of activated charcoal and he vomited once while taking it. He then had a grand mal seizure lasting about 2 minutes, and was treated with 10 mg haloperidol intramuscularly and 2.5 mg diazepam intravenously, with oxygen by mask. After two further seizures of about 30 seconds each he received another 2.5 mg diazepam. No further seizures ensued, but myoclonic jerks were noted in all limbs. Vital signs were normal throughout and pulse oxymetry showed good oxygenation except during seizure activity, when he became cyanosed. Petechial haemorrhages were noted around the face and trunk after the seizures.

Central venous and arterial lines were sited. The results of routine blood tests, electrocardiography and chest radiography were normal. A drug screen was negative for all substances including alcohol. The only abnormal result was in arterial blood gases which showed a metabolic acidosis (pH 7.06 and base excess −19, $PaCO_2$ 38.7). The patient was given 100 mL 8.4% sodium bicarbonate solution, catheterized and sent to intensive care for close monitoring.

Vital signs remained normal, and the blood gases resolved (Table 1). Renal function was normal throughout and there was no haematuria. The patient's only complaint was of slight dizziness. He was discharged from the hospital after 48 hours.

COMMENT

C-4 contains 90% cyclotrimethylenetrinitramine (RDX) and 10% polyisobutylene. During this episode we sought

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Table 1 **Arterial blood gases**

	1900 h	*2100 h*
pH	7.06	7.37
PCO_2	38.7	40.7
PO_2	300	151
HCO_3	11	24
BE	−19	−1.0
SaO_2	100	99

BE=base excess

advice from the Poisons Information Services in the UK. The acute effects of RDX ingestion have included staring into space, generalized seizures, lethargy, coma, muscular twitching, hyperreflexia, myalgias, headaches, vomiting, mild renal injury and haematuria[1,2]. Gastrointestinal symptoms typically begin after 3 hours and central nervous system signs after 8–12 hours. A petechial rash mimicking meningococcaemia has been reported after seizures[3]. Myalgia and myoclonus are frequently noted. RDX is metabolized in the liver to carbon dioxide, bicarbonate and formic acid and excretion is via the kidneys. The elimination half-life is 15 hours. The toxic dose of RDX is unknown but there is a case report of a 3-year-old who ingested 84.82 mg/kg and survived[4]. In rats the lethal dose is about 200 mg/kg when it is given as a 4% solution[5]. Treatment is symptomatic and supportive, the most important points being control of seizures and maintenance of oxygenation.

Polyisobutylene is a hydrocarbon and the principal acute hazard is aspiration, leading to pneumonitis and chronic lung dysfunction. Other acute effects of inhalation include cardiac arrhythmias and central nervous system depression. Nausea and vomiting may follow ingestion, and acute tubular necrosis, proteinuria and haematuria may develop. As with RDX, management is supportive, with particular attention to the respiratory system. Patients with a normal chest X-ray and no symptoms 6 hours after ingestion can be discharged.

Amongst field troops in Vietnam it became common knowledge that ingestion of a small amount of C-4 would produce a 'high' similar to that of ethanol, and it is possible that this was the reason for this episode[2]. The patient's clinical picture was dominated by the effects of RDX, with few from polyisobutylene. The help provided by the Poisons Information Services was invaluable.

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Cardiac myxoma with three recurrences

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About 5% of patients with cardiac myxoma have a family history of the disorder[1], and in this group the tumour is most likely to recur after surgery[2].

CASE HISTORY

At the age of 21 a woman underwent thoracotomy for removal of a left atrial myxoma. Her mother and sister had both died suddenly, at ages 31 and 19; necropsy in the sister had revealed a left atrial myxoma. 12 years after operation, the patient complained of shortness of breath, palpitations, and a persistent ache and paraesthesiae in the right forearm and fingers. On examination she had a systolic murmur at the left parasternal edge, and investigations showed reappearance of the tumour, this time in the right atrium in the region of the fossa ovalis. A sternotomy was performed and a 10 cm long and 1 cm diameter mass of myxoma arising from the limbus was widely excised with the fossa ovalis. The defect was repaired with Dacron. 11 years later, recurrence of the tumour was discovered in the right ventricle with involvement of the tricuspid valve, after the onset of bilateral claudication. A sternotomy was performed again, and an enormous tumour was found in the right ventricle with involvement of the tricuspid valve and several papillary muscles. The tumour was excised with the

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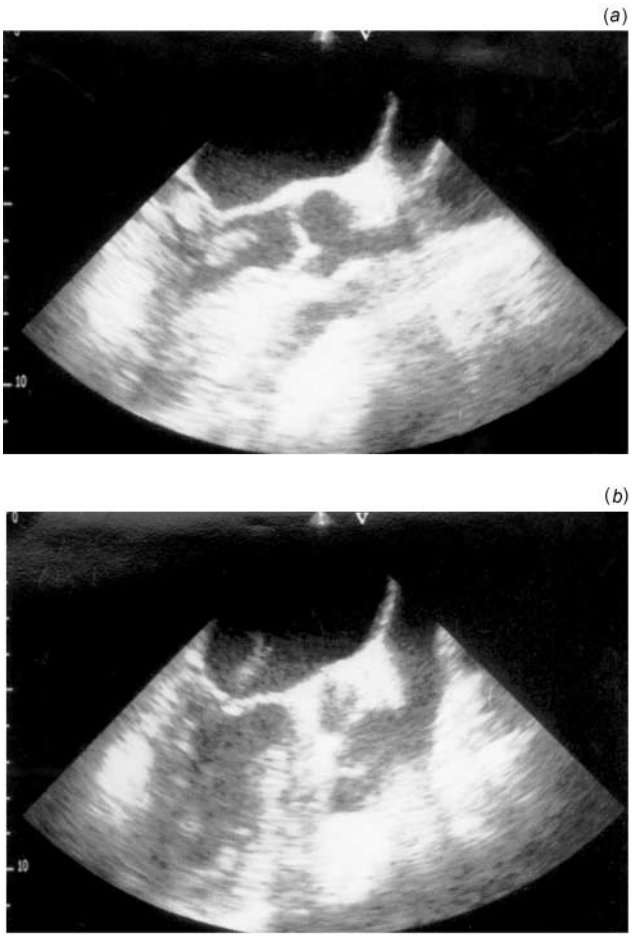

Figure 1 **Transoesophageal echocardiogram showing mobile myxoma attached to the mitral valve.** (*a*) Myxoma flipping into the left ventricle during diastole; (*b*) myxoma flipping into the left atrium during systole.

tricuspid valve, which was replaced with a Carpentier–Edwards xenograft. A 2 cm tumour in the left atrium was also excised, the defect being repaired with a patch. The left ventricle was explored but no tumour was found on the mitral or aortic valves. 16 years later a cardiac murmur was heard on routine follow-up and transoesophageal echocardiography revealed a 3 cm lesion, this time on the posterior mitral valve leaflet. The tumour was very mobile and was flipping in and out of the left atrium during diastole and systole (Figure 1). Sternotomy was done again, the tumour was excised and the mitral valve was preserved. Histology confirmed myxoma tissue on each recurrence.

COMMENT

Even in families, multiple recurrences of this kind have seldom been reported[3]. Myxomas can develop in any chamber of the heart, the most common site being the left atrium; often they are bilateral. In families the disorder is transmitted in autosomal dominant fashion and has a predeliction for young women[4]. It can also be a component of Carney's complex, a familial multiple neoplasia/lentiginous syndrome. A family history should be sought in all patients with cardiac myxoma.

Cardiac myxomas sometimes present with valvular obstruction, which can give a picture of mitral disease or right heart failure. Neurological deficits tend to arise when the myxoma gets infected and the friable tumour tissue embolizes to the brain or the limbs. Some myxomas are sufficiently mobile to move through the atrioventricular valves during diastole, exerting a 'wrecking ball' effect that damages the valve leaflet and causes anaemia and a high erythrocyte sedimentation rate. Constitutional symptoms such as fever, malaise and weight loss can result from elaboration of the cytokine interleukin-6. Right bundle block has been recorded in as many as one-third of cases. The most useful diagnostic investigation is echocardiography, though large vegetations, an infected thrombus, or even mitral valve prolapse can produce patterns that are indistinguishable from myxoma. Transthoracic echocardiography is the most commonly used, but transoesophageal echocardiography has better specificity and sensitivity.

The recurrent myxomas can be divided into four groups—inadequate resection, familial, totipotent multicentricity and metastatic recurrence. Multifocal disease is frequent in the familial setting[4]. Recurrence has been associated with abnormal DNA ploidy in up to 40% of the patients. Indeed, DNA testing of all patients with cardiac myxoma may prove to be the best predictor of the likelihood of recurrence[5].

Surgical excision must be done as soon as possible after diagnosis because of the high risk of valve obstruction or systemic embolization. Ideally, the tumour should be excised with a large cuff of atrial septum. Valve replacement may be necessary, and there is a report of cardiac transplantation in a woman with recurrent disease[6].

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Grease-gun injury to the penis

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Accidental high-pressure injection of oils—grease-gun injury—has become increasingly common. We report a non-accidental variant.

CASE HISTORY

At age 31 a man used a high-pressure pneumatic grease-gun to inject his penis in the hope of increasing its girth. Unfortunately the width continued to increase and he also developed erectile dysfunction. He sought urological advice 7 years after the initial incident.

On examination the penis was grossly deformed with areas of nodular subcutaneous thickening. An MRI scan, performed after intracavernosal injection of 5 μg prostaglandin E1, showed marked thickening of the penile skin and subcutaneous tissue with areas of calcification and globules of grease. There was no involvement of the corpora cavernosa or corpus spongiosum (Figure 1).

The affected subcutaneous tissue and globules of grease were excised in a staged procedure over three separate admissions. On histological examination the specimens showed extensive fibrosis and foreign-body granulomatous changes. Six months postoperatively, the patient had regained erectile function sufficient to permit sexual intercourse.

COMMENT

For over a century people have attempted to embellish the human body by injecting various oils beneath the skin[1]. Injection of the penis with material such as paraffin and Vaseline, to increase its circumference, has been particularly seen in South-east Asia[2,3]. In addition, the subcutaneous self-implantation of spherical objects in the penis is a well-known practice among members of the Yakuza in Japan. Increased sexual confidence is a major reason for these implantations, which are usually performed under primitive conditions[4]. Complications, which are

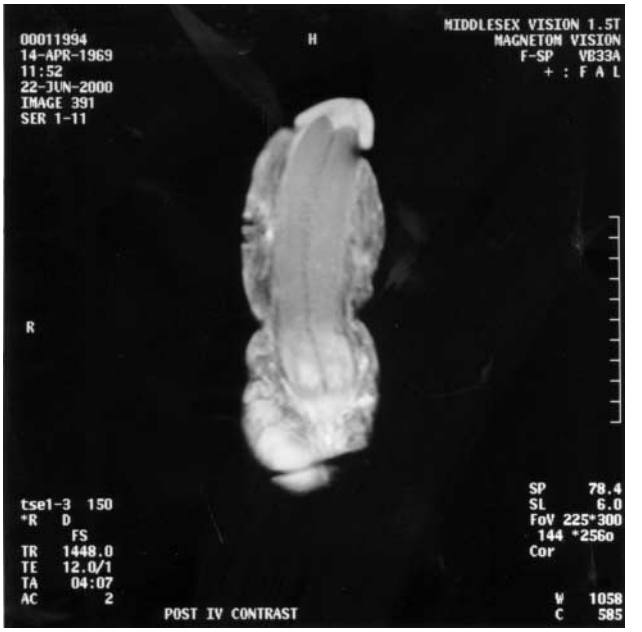

Figure 1 **Sagittal T2 weighted, fat-saturation penile MRI image (after intravenous contrast)**

frequent, include penile deformity, necrosis/ulceration of the skin, erectile dysfunction and inability to have intercourse[2].

Accidental injuries with high-pressure devices such as grease-guns most commonly affect the hand and fingers and pose a therapeutic challenge for the surgeon. Their severity is related to the nature, pressure, volume and toxicity of the injected substance. The major hazard of this injury is a toxic oedema followed by ischaemia, causing gangrene[4].

We have not found any previous report of a self-inflicted high-pressure grease-gun injection into the penis. In this case the extent of tissue damage was difficult to establish, but MRI clearly showed that underlying corpora were not involved; thus all affected subcutaneous tissue could be excised without damage to normal tissue. Staging of the procedure was necessary to minimize the risk of devascularization of the overlying skin. As in all cases of self-injection, a referral for psychological counselling was warranted.

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